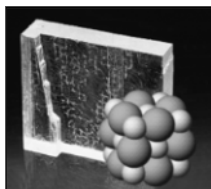
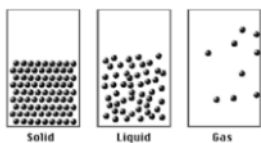


# Matter And Energy



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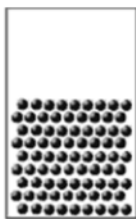
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## Kinetic Nature of Matter

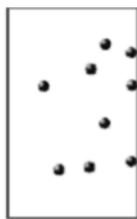
Matter consists of atoms and molecules in \_\_\_\_\_.



Solid



Liquid



Gas

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## STATES OF MATTER

- \_\_\_\_\_ — have rigid shape, fixed volume. External shape can reflect the atomic and molecular arrangement.
  - Reasonably well understood.
- \_\_\_\_\_ — have no fixed shape and may not fill a container completely.
  - Not well understood.
- \_\_\_\_\_ — expand to fill their container.
  - Good theoretical understanding.

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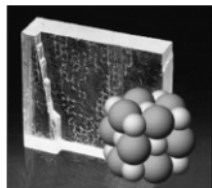
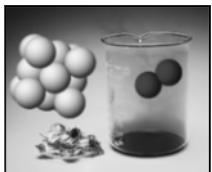
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## Physical Properties

What are some physical properties?

- color
- melting and boiling point
- odor



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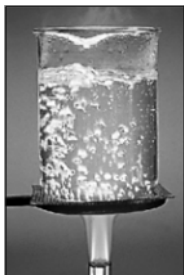
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## Physical Changes

— can be observed without changing the identity of the substance

Some physical changes would be

- boiling of a liquid
- melting of a solid
- dissolving a solid in a liquid to give a homogeneous mixture — a SOLUTION.



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## Chemical Properties and Chemical Change

• Burning hydrogen ( $H_2$ ) in oxygen ( $O_2$ ) gives  $H_2O$ .



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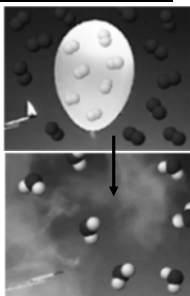
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## Chemical Properties and Chemical Change

• Burning hydrogen ( $H_2$ ) in oxygen ( $O_2$ ) gives  $H_2O$ .

• Chemical change or *chemical reaction* — transformation of one or more atoms or molecules into one or more different molecules.



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## Sure Signs of a Chemical Change

- Heat
- Light
- Gas Produced (not from boiling!)
- Precipitate – a solid formed by mixing two liquids together

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## Physical vs. Chemical

- Examples:
  - melting point      physical
  - flammable          chemical
  - density              physical
  - magnetic            physical
  - tarnishes in air      chemical

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## Physical vs. Chemical

- Examples:
  - rusting iron
  - dissolving in water
  - burning a log
  - melting ice
  - grinding spices

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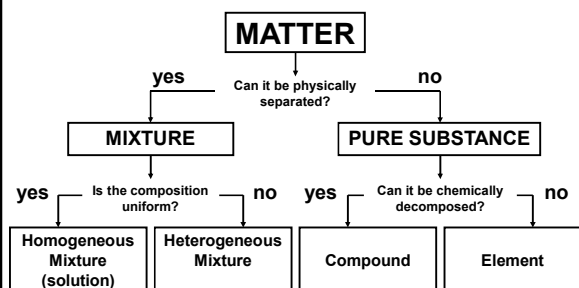
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## Matter Flowchart



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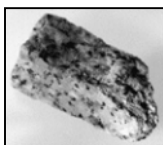
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## Types of Mixtures

- Variable combination of 2 or more pure substances.



Heterogeneous –  
visibly separate phases



Homogeneous –  
Same throughout

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